MULTIMEDIA UNIVERSITY

SUPPLEMENTARY EXAMINATION

TRIMESTER 1, 2015/2016

PBM0045 – MATHEMATICS
(Foundation in Management)

18 NOV 2015
2.30 PM – 4.30 PM
(2 HOURS)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages with **FOUR** questions.

2. Attempt **ALL** four questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

Question 1 (25 Marks)

a.   Simplify the following expression.

$$\frac{\dfrac{x+4}{3}}{\dfrac{5}{4}+\dfrac{5}{x}}$$ (3 marks)

b.   Solve for $\sqrt{2x+9}-\sqrt{x+1}=2$ (8 marks)

c.   Solve the following inequality and graph your answer on the real number line.
$$x^2-3x-4<0$$ (5 marks)

d.   Given that,

$$f(x)=\begin{cases}2-x, & -2<x<1\\3, & x=1\\x^2-1, & 1<x\le4\end{cases}$$

i.   Determine the domain of function f.   (1 mark)
ii.   Compute the value of $2f(-1)-f(1)+4f(3)$.   (3 marks)

e.   Find the equation of the line that is perpendicular to the line $2y=-6x+2$ and containing the point $(-3,4)$. Express your answer in slope-intercept form.
                                    (5 marks)

Continued...

Question 2 (25 Marks)

a. In an arithmetic progression, the fifth term is 16 and the thirteenth term is 40. Find the first term and the common difference of this progression.   (4 marks)

b. i. Find the value of x if x, $x+2$, $x+3$ are the first three terms of a geometric progression.   (4 marks)

    ii. Using the answer in b (i) to find the sum for the first ten terms of the above geometric progression. (Give your answer in 3 decimal points).   (4 marks)

c. Given $A = \begin{bmatrix} 2 & -1 & 0 \\ 0 & 1 & 1 \\ 1 & 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 10 \\ 4 \end{bmatrix}$ and $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$.

    i. Find $B^T B$.   (2 marks)
    ii. If $AX = B$, find the values of x, y and z by using the inverse of the coefficient matrix.   (11 marks)

Question 3 (25 Marks)

a. Find $\dfrac{dy}{dx}$ for the following functions and simplify your answers.

    i. $y = (2x^2 + 3)(\dfrac{4}{5}x^3 - 2x - 5)$ (4 marks)

    ii. $y = \dfrac{2x^4 - 3}{(3x+5)^3}$ (5 marks)

    iii. $y = 6\left(\sqrt[4]{(x^8 + 1)^3}\right)$ (4 marks)

b. Find an equation of the tangent line to the curve $y = \dfrac{1}{2x^5} + \dfrac{2}{x^3}$ at $x = 2$.   (6 marks)

c. Find $\dfrac{dy}{dx}$ if $y = \sqrt{u} + \dfrac{1}{u^3}$ and $u = (x^3 - x)$.   (6 marks)

Continued…

Question 4 (25 Marks)

a.   Find the following integrals:

i. $\int x^3\left(x^2+5x+2\right)dx$ (4 marks)

ii. $\int_1^8\left(x^{\frac{1}{3}}-x^{-\frac{1}{3}}\right)dx$ (4 marks)

b.   Determine the integral using substitution $u=5-x-x^2$:

$\int \dfrac{9+18x}{\left(5-x-x^2\right)^4}\ dx$ (6 marks)

c.   Given the marginal-revenue function

$\dfrac{dr}{dq}=\dfrac{900}{(2q+3)^3}$

i.   Find the revenue function, r (knowing that when $q=0$, $r=0$).

(8 marks)

ii.   After that, find the demand function, p (given $r=pq$).

(3 marks)

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